

WHAT IS CLAIMED IS:

1. A converter which comprises:

a transformer having a primary winding, a secondary winding and an auxiliary winding;

5 a first switching device for connecting an input voltage to the primary winding of the transformer;

an output circuit connected to the secondary winding;

a controller; and

10 an integrated active clamp and primary bias circuit including the auxiliary winding and a second switch for providing a bias voltage to the controller to alternately operate the first and second switches between conductive and non-conductive states such that when the first switch is conductive the second switch is nonconducting and power is transferred from the primary winding to the output circuit via the secondary winding and from the auxiliary winding to the controller and, when the first switch is nonconducting, the second switch is conducting to provide voltage clamping.

2. A forward converter which comprises:

a transformer having a primary winding, a secondary winding and an auxiliary winding;

5 a first switching device for connecting an input voltage to the primary winding of the transformer;

an output circuit connected to the secondary winding;

a controller; and

10 an integrated active clamp and primary bias circuit including the auxiliary winding, a second switch, an inductor and a capacitor connected in series with the second switch, the capacitor and the second switch being connected in parallel with the auxiliary winding, the integrated active clamp and primary bias circuit providing a bias voltage to the controller, the controller alternately operating the first and second

switches between conductive and non-conductive states during first and second parts of a switching cycle such that in the first part of the cycle the first switch is conductive, the
15 second switch is nonconducting and power is transferred from the primary winding to the output circuit via the secondary winding and from the auxiliary winding to the controller and to the inductor, and in the second part of the cycle, the first switch is nonconducting, the second switch is conducting and the voltage across the primary switch is clamped via the second switch and the capacitor and power is supplied to the
20 controller via the inductor.

3. A flyback converter which comprises:
a flyback transformer having a primary winding, a secondary winding and an auxiliary winding;
a first switching device for connecting an input voltage to the primary winding
5 of the transformer;
an output circuit connected to the secondary winding;
a controller; and
an integrated active clamp and primary bias circuit including the auxiliary winding, a second switch in series with the auxiliary winding, and a capacitor connected
10 in parallel with the auxiliary winding and the second switch, the integrated active clamp and primary bias circuit providing a bias voltage to the controller, the controller alternately operating the first and second switches between conductive and non-conductive states during first and second parts of a switching cycle such that in the first part of the cycle the first switch is conductive, the second switch is nonconducting and
15 energy is stored in the transformer and in the second part of the cycle the first switch is nonconducting, the second switch is conducting and power is transferred to the output circuit and the controller, and the voltage across the first switch is clamped via the auxiliary windings, second switch and the capacitor.

4. A forward-flyback converter which comprises:

a flyback transformer having a primary winding, a secondary winding and an auxiliary winding;

5 a first switching device for connecting an input voltage to the primary winding of the transformer;

an output circuit connected to the secondary winding;

a controller; and

an integrated active clamp and primary bias circuit including the auxiliary winding, a second switch, an inductor and a capacitor connected in series with the
10 second switch, the capacitor and the second switch being connected in parallel with the auxiliary windings the integrated active clamp and primary bias circuit providing a bias voltage to the controller, the controller alternately operating the first and second switches between conductive and non-conductive states during first and second parts of a switching cycle such that in the first part of the cycle the first switch is conductive, the
15 second switch is nonconducting and power is transferred from the primary winding to the output circuit via the secondary winding and from the auxiliary winding to the controller and to the inductor, and in the second part of the cycle the first switch is nonconducting, the second switch is conducting and the voltage across the primary switch is clamped via the second switch and the capacitor and power is supplied to the
20 controller via the inductor.

5. A converter according to claim 2, wherein the integrated active clamp and primary bias circuit includes a first diode arranged to be forward biased during the first part of the switching cycle and reverse biased during the second part of the cycle to enable power to flow from the auxiliary winding to the inductor and the controller
5 only during the first part of the cycle and a second diode arranged to be reversed biased during the first part of the cycle and forward biased during the second part of the cycle

to allow power to be transferred from the inductor to the controller during the second part of the cycle.

6. A converter according to claim 4, wherein the integrated active clamp and primary bias circuit includes a first diode arranged to be forward biased during the first part of the switching cycle and reverse biased during the second part of the cycle to enable power to flow from the auxiliary winding to the inductor and the controller only during the first part of the cycle and a second diode arranged to be reversed biased during the first part of the cycle and forward biased during the second part of the cycle to allow power to be transferred from the inductor to the controller during the second part of the cycle.